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VISUAL PALATABILITY OF FOOD IN PATIENTS WITH EATING DISORDERS AND DIETING WOMEN

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Summary—The effects of 19 meals of different caloric content on slides on palatability and hypothetical duration of consumption were investigated in 7 patients with anorexia nervosa, 17 patients with bulimia nervosa at the beginning and after 8 weeks of hospital treatment. Nine healthy females served as controls. At the beginning of treatment, palatability of low caloric food was significantly higher and hypothetical duration of consumption of high caloric food was significantly longer in patients when compared to controls. After 8 weeks, in the patients palatability of low caloric food had decreased. Dislike for high caloric food remained stable in anorexics.

INTRODUCTION

In patients with eating disorders the emotional response to food seems mainly determined by the presumed caloric content resulting in a dislike of food which is assumed to be high in caloric content (Rosen, Leitenberg, Fisher & Khazam, 1986; Morgan & Russell, 1975). The perceived pleasantness (palatability) of food is highly sensory-dependent and was identified by Le Magnen (1983) as a major determinant of meal size and of initiation of food intake. Thus in eating disorders palatability of food may be altered in a way that high caloric food becomes disliked, since it is associated with anticipated negative consequences, i.e. the fear of triggering a binge and fear of weight gain. In contrast, low caloric food is more liked, because its consumption has been rewarded by weight loss or maintenance of low body weight.

It has never been investigated in patients with anorexia and bulimia nervosa, whether this dislike or like relates only to food which is expected to be consumed, or whether the mere visual presentation of food can also elicit these emotional responses. Another more behavioural aspect of food-related responses possibly associated with palatability refers to the alteration of the duration of consumption, which seems well established by behavioural observation (Abraham & Beumont, 1982; Mitchell & Laine, 1985; Johnson, Stuckey, Lewis & Schwartz, 1982). At present it is unknown whether these peculiarities represent merely biological correlates of starvation or specific psychological features of anorexia and bulimia nervosa. It has repeatedly been shown that despite normalization of body weight and improvement of binging and vomiting abnormal attitudes and behaviour related towards food persisted in many patients (Hsu & Holder, 1986; Toner, Garfinkel & Garner, 1986; Clinton & McKinlay, 1986). Whether this applies also for the palatability of foods differing in caloric content and the duration of consumption of food has not been systematically investigated. The few psychological studies available assessed palatability of food mostly by questionnaires (e.g. Van Binsbergen, Hulshof, Wedel, Odink & Coelingh Bennick, 1988). The majority of studies on eating behaviour in anorexics or bulimics focused on (macro-) nutritional and caloric contents of binges, taste perception and other sensory mechanisms during the intake of 'real' food (Rolls, Rowe & Rolls, 1982; Lacey, Stanley, Crutchfield & Crisp, 1977; Mitchell & Laine, 1985; Kissileff, Walsh, Kral and Cassidy, 1986; Walsh, Kissileff, Cassidy & Dantzic, 1989; Drewnowski, Halmi, Pierce, Gibbs & Smith, 1987; Drewnowski, Pierce & Halmi, 1988).

In the present study, except for the sight of food, all other food-related sensory stimuli were not present, hence duration of consumption was only hypothetical.

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The following hypotheses were investigated:

1. Palatability of low caloric food is higher in anorexics and bulimics at the onset of treatment than in dieting controls at their maximum of weight loss.
2. After improvement of the eating disorder, palatability of low and high caloric food is not different in anorexics and bulimics and normal weight controls after a period of normal food intake.
3. Hypothetical duration of consumption of low and high caloric food is longer in patients with anorexia and bulimia nervosa at the onset of treatment when compared to dieting controls at their maximum of weight loss.
4. After improvement of the eating disorder, hypothetical duration of consumption of food, irrespective of its caloric content, is not different in anorexics and bulimics and normal weight controls after a period of normal food intake.

METHODS

Subjects

Nine consecutively admitted inpatients with *anorexia nervosa* (DSM-III-R; American Psychiatric Association, 1987), all exclusively dieters, mean age 21.9 ± 2.9 years and mean duration of the illness 4.4 ± 3.4 years were investigated at an average body weight of 66.1 ± 8.5% IBW (calculated according to the tables of the Metropolitan Life Insurance Company, 1959) and after 8 weeks of behaviour therapy at a mean body weight of 74.4 ± 10.4% IBW.

Twenty inpatients with *bulimia nervosa* (DSM-III-R; American Psychiatric Association, 1987) weighing 101.9 ± 12.9% IBW at a mean age of 21.7 ± 2.9 years and a mean duration of the illness of 5.5 ± 2.9 years were investigated. The first examination was at the onset of behavioural treatment when self-reported frequency of binding and vomiting was 10.6 ± 6.9 times respectively 11.7 ± 6.9 times per week. The patients were reexamined after 8 weeks of treatment when the mean frequency of binging and vomiting was reduced to 1.8 ± 3.3 respectively 1.9 ± 3.4 times per week. Their average body weight did not change significantly (103.8 ± 13.5% IBW).

Controls

Nine healthy female women aged 22.3 ± 1.2 years were recruited by advertisement and served as controls. They participated in a study on the influence of dieting on the menstrual cycle (for details see Pirke, Schweiger, Strowitzki, Tuschl, Laessle, Broocks, Huber and Middendorf, 1989). Subjects were examined at their maximum of weight loss (100.8 ± 4.8% IBW) after a 4-week period of restricted food intake (1000 kcal/day) and at their normal average body weight of 106.6 ± 5.3% IBW.

Instruments and experimental design

At both times of the examination an identical standardized, constant series of 19 colored slides with a projected size of 33 × 22 cm was presented, showing in a distance (screen to eye) of 130 cm 19 different food items (i.e. meals) listed in the Appendix. Five low caloric and 5 high caloric food items represented the experimental categories. Nine food items of mixed caloric content served as a control category. The subject determined the speed of the presentation by switching to the next slide. While the subject was looking at the food item presented on the slide, palatability of each food item was related between strong like (1) and complete dislike (5) on a 5-point Likert-scale. Hypothetical duration of consumption was estimated by the subject for each single food item in minutes. For each subject ratings of each single food item were summed up in each category (i.e. high, low, and mixed caloric content, respectively) and divided by the number of items.

The duration of the presentation of the 19 food items was 25 min on an average. Before and immediately after the presentation appetite, hunger and mood (as a distractor scale) were rated on 100 mm visual analog scales.

Statistical analysis

Data were analyzed by means of repeated-measures multivariate analysis of variance (MANOVA) (see O'Brian & Kaiser, 1985, for details of this approach). The Between-Subjects factor was GROUP (Anorexics, Bulimics, Controls) and the Within-Subjects factor was TIME (onset of treatment vs after 8 weeks of treatment for the patient groups; maximum of weight loss vs normal weight for the controls). *A priori* contrasts were specified in order to separately compare mean values of anorexics vs controls and bulimics vs controls. Three bulimics and two anorexics had to be excluded from this analysis because of a lack of data at the second examination.

RESULTS

Palatability of low and high caloric food

Mean values of palatability ratings are presented in Table 1. The MANOVA revealed a significant GROUP × TIME interaction for anorexics [$F(1,30) = 6.94$, $P < 0.05$] and bulimics [$F(1,30) = 5.46$, $P < 0.5$] when compared to controls: palatability of *low caloric food* had decreased in anorexics and bulimics after 8 weeks of treatment in contrast to controls showing an increase in palatability of low caloric food at normal weight. These different changes were mainly due to significant group differences at the onset of treatment [anorexics vs controls: $F(1,30) = 5.8$, $P < 0.05$; bulimics vs controls: $F(1,30) = 3.4$, $P < 0.10$], whereas after 8 weeks of treatment mean ratings of patients and controls were statistically equivalent.

With respect to the palatability of *high caloric food*, MANOVA revealed a significant effect of GROUP for anorectics [$F(1,30) = 8.7$, $P < 0.01$], but no effects of TIME or GROUP × TIME, meaning that there was no significant change of palatability over time in these patients. Anorexics showed stronger dislike of high caloric food than controls at the onset of treatment [$F(1,30) = 7.8$, $P < 0.01$] as well as after 8 weeks of treatment [$F(1,30) = 6.6$, $P < 0.05$]. For bulimics effects of TIME or GROUP × TIME were also not significant. However, dislike of high caloric food at the onset of treatment tended to be higher when compared to controls [$F(1,30) = 3.9$, $P < 0.10$].

Regarding the palatability of the control category containing food of mixed caloric content, no significant effects were found.

Hypothetical duration of consumption of low and high caloric food

According to the MANOVA, mean values of hypothetical duration of consumption of *low caloric* food at both times of examination were not significantly different in the groups (Table 2), At the onset of treatment, however, there was a nonsignificant trend towards longer hypothetical duration of consumption of low caloric food in bulimics when compared to controls [$F(1,30) = 4.0$, $P < 0.10$]. With respect to the hypothetical duration of consumption of food with *high caloric* content, a significant effect of GROUP was found indicating a longer hypothetical duration of consumption at the onset of treatment in bulimics [$F(1,30) = 5.5$, $P < 0.05$] and in anorexics [$F(1,30) = 4.5$, $P < 0.05$] when compared with the control group. Regarding the category of mixed caloric food, the MANOVA also revealed a significant effect of GROUP: at the onset of treatment in anorexics hypothetical duration of consumption was significantly prolonged in comparison to the control group [$F(1,30) = 5.9$, $P < 0.05$]. In bulimics, this effect was marginally significant [$F(1,30) = 3.9$, $P < 0.10$].

Table 1. Scores (mean ± SD) of dislike (min. = 1, max. = 5) of food of low, high and mixed caloric content in anorexics and bulimics at the onset and after 8 weeks of treatment and in controls at the maximum of weight loss and at normal weight

Food category	Anorexics $n = 7$	Bulimics $n = 17$	Controls $n = 9$
	Onset of treatment		Maximum of weight loss
Low caloric content	2.2 ± 0.90	2.6 ± 0.80	3.15 ± 0.60
High caloric content	4.2 ± 0.70	3.6 ± 0.90	2.9 ± 1.0
Mixed caloric content	3.2 ± 0.30	2.8 ± 0.80	2.4 ± 0.80
	After 8 weeks of treatment at normal weight		
Low caloric content	2.8 ± 0.60	2.8 ± 0.70	2.7 ± 0.60
High caloric content	4.0 ± 0.50	3.3 ± 0.90	3.1 ± 0.60
Mixed caloric content	2.9 ± 0.60	2.8 ± 0.70	2.7 ± 0.60

Table 2. Minutes (mean ± SD) of hypothetical duration of consumption (in minutes) of food of low, high and mixed caloric content in anorexics and bulimics at the onset and after 8 weeks of treatment and in controls at the maximum of weight loss and normal weight

Food category	Anorexics $n = 7$	Bulimics $n = 17$	Controls $n = 9$
	Onset of treatment		Maximum of weight loss
Low caloric content	16.6 ± 5.0	20.4 ± 14.7	11.1 ± 4.3
High caloric content	25.1 ± 8.3	23.9 ± 15.4	12.4 ± 3.0
Mixed caloric content	21.4 ± 7.9	18.1 ± 9.5	11.7 ± 2.2
	After 8 weeks of treatment at normal weight		
Low caloric content	14.7 ± 4.9	17.2 ± 11.0	12.8 ± 4.0
High caloric content	18.9 ± 5.2	19.8 ± 12.5	14.1 ± 4.6
Mixed caloric content	17.7 ± 5.0	17.5 ± 8.8	13.1 ± 5.3

DISCUSSION

Regarding visual palatability of food, no statistical differences were found between anorexics and bulimics. Palatability of food at the onset of treatment in both patient groups, however, deviated from food preferences in controls at their maximum of weight loss. Increased like of high caloric food and decreased dislike of low caloric food was observed in controls who had been dieting for 4 weeks. This adds to the findings of other studies in normal subjects (e.g. Booth, Mather & Fuller, 1982; Cabanac, Minare & Adair, 1968; Cabanac, 1971; Jacobs & Sharma, 1969). In anorexics and bulimics the opposite finding was observed: At the onset of treatment palatability of low caloric food was increased and high caloric food was more disliked than at the second examination.

These findings hint to psychological differences induced by pathological long-term dieting and severe weight loss associated with psychopathological symptoms in contrast to the emotional food-related responses of temporary dieting in healthy women. Although the eating disorder had improved after 8 weeks of behavioral treatment and some subtle changes might have occurred due to the mere exposure to food which previously had been avoided. Low caloric food still has reinforcing properties for anorexics and bulimics. The stable aversive quality of high caloric food may, in addition to the psychopathology of patients with an eating disorder, override perhaps biologically established food preferences still present in controls dieting for a few weeks.

The slowness of estimated duration of consumption in eating disorders at the onset of treatment is in line with clinical experience with anorexics but also with intermittently fasting bulimics. The long hypothetical duration of consumption in the patient group does not seem to reflect the "extended enjoyment" of eating, but rather represents the protraction of the feared food intake. Probably this finding hints to the deficits of patients with an eating disorder to adequately assess the time of consuming food they have avoided for a long time. Individual variations in hypothetical duration of consumption was remarkable in controls and in patients. Whether the intraindividual variability of the rate of eating reported by others (e.g. Abraham & Beumont, 1982) is related to variations in appetite and hunger in patients with anorexia and bulimia nervosa, however, has not been scrutinized.

Although the findings of this study are in line with clinical observations, the results cannot be generalized to emotional and behavioral responses to "real" food, which the subjects are expected to consume.

In spite of their preliminary character, due to the small sample size and methodological shortcomings, the data reported cast doubts on the hypothesis that altered food preferences in patients with anorexia of bulimia nervosa may merely be a consequence of dieting.

REFERENCES

Abraham, S. F. & Beumont, P. J. V. (1982). How patients describe bulimia or binge eating. *Psychological Medicine, 12,* 625–635.

American Psychiatric Association (1987). *Diagnostic and Statistical Manual of Mental Disorders-revised (DSM IIIR).* Washington, D.C.: APA.

Booth, D. A., Mather, P. & Fuller, J. (1982). Starch content of ordinary foods associatively conditions human appetite and satiation, indexed by pleasantness of starch-paired flavors. *Appetite, 3,* 163–184.

Cabanac, M. (1971). Physiological role of pleasure. *Science, New York, 173,* 1103–1107.

Cabanac, M., Minare, Y. & Adair, E. (1968). Influence of internal factors on the pleasantness of gustative sweet sensation. *Comments in Behavioural Biology, Part A1,* 77–82.

Clinton, D. N. & McKinlay, W. W. (1986). Attitudes to food, eating and weight in acutely ill and recovered anorectics. *British Journal of Clinical Psychology, 25*, 61–67.
Drewnowski, A., Pierce, B. & Halmi, K. A. (1988). Fat aversion in eating disorders. *Appetite, 10*, 119–131.
Drewnowski, A., Halmi, K. A., Pierce, B., Gibbs, J. & Smith, G. P. (1987). Taste and eating disorders. *American Journal of Clinical Nutrition, 46*, 442–450.
Hsu, L. K. G. & Holder, D. (1986) Bulimia nervosa: Treatment and short-term outcome. *Psychological Medicine, 16*, 65–70.
Jacobs, H. & Sharma, K. (1969). Taste vs calories: Sensory and metabolic signals in the control of food intake. *Annals of the New York Academy of Sciences, 157*, 1084–1125.
Johnson, C. L., Stuckey, M. K., Lewis, L. D. & Schwartz, D. M. (1982). Bulimia: A descriptive survey of 316 cases. *International Journal of Eating Disorders, 2*, 3–16.
Kissileff, H. R., Walsh, B. T., Kral, J. G. & Cassidy, S. M. (1986). Laboratory studies of eating behaviour in women with bulimia. *Physiology and Behavior 38*, 563–570.
Lacey, J. H., Stanley, P. A., Crutchfield, M. & Crisp, A. H. (1977). Sucrose sensitivity in anorexia nervosa. *Journal of Psychosomatic Research, 21*, 17–21.
Le Magnen, J. (1983). Body energy balance and food intake: A neuro-endocrine regulatory mechanism. *Psychological Review, 63*, 314–386.
Metropolitan Life Insurance Company (1959). New weight standards for men and women. *Statistical Bulletin, Metropolitan Life Insurance Company, 40*, 1–40.
Mitchell, J. E. & Laine, D. C. (1985). Monitored binge-eating behaviour in patients with bulimia. *International Journal of Eating Disorders, 4*, 177–183.
Morgan, H. G. & Russell, G. F. M. (1975) Value of family background and clinical features as predictors of long-term outcome in anorexia nervosa: Four-year follow-up study of 41 patients. *Psychological Medicine, 5*, 355–371.
O'Brian, R. G. & Kaiser, M. K. (1985). MANOVA Method for analyzing repeated measures designs: an extensive primer. *Psychological Bulletin, 97*, 316–333.
Pirke, K. M., Schweiger, U., Strowitzki, T., Tuschl, R., Laessle, R. G., Broocks, A., Huber, B. & Middendorf, R. (1989). Dieting causes menstrual irregularities in normal weight young women through impairment of episodic luteinizing hormone. *Fertility and Sterility, 51*, 88–94.
Rolls, B. J., Rowe, E. A. & Rolls, E. T. (1982). How sensory properties of foods affect human feeding behaviour. *Physiology and Behavior, 29*, 409–417.
Rosen, J. C., Leitenberg, H., Fisher, C. & Khazam, C. (1986). Binge-eating episodes in bulimia nervosa: The amount and type of food consumed. *International Journal of Eating Disorders, 5*, 255–267.
Toner, B. B., Garfinkel, P. E. & Garner, D. M. (1986). Long-term follow-up of anorexia nervosa. *Psychosomatic Medicine, 48*, 520–529.
Van Binsbergen, C. J. M., Hulshof, K. F. A. M., Wedel, M., Odink, J. & Coelingh Bennink, H. J. T. (1988). Food preferences and aversions and dietary pattern in anorexia nervosa patients. *European Journal of Clinical Nutrition, 42*, 671–678.
Walsh, B. T., Kissileff, H. R., Cassidy, S. M. & Dantzic, S. (1989). Eating behaviour of women with bulimia. *Archives of General Psychiatry, 46*, 54–58.

APPENDIX

Food items presented on slides. (Numbers refer to the position in the series.)

High caloric content	Mixed caloric content
1 roast beef with cream sauce	2 poached mackerel
4 walnut layer cake	3 Irish stew
6 pâté	9 chicken curry
7 roast duckling with oranges	11 fish casserole with herbs
10 leg of pork	13 ice-cream
	14 fried carrots
Low caloric content	16 appetizer sandwiches
	17 whole-meal apple pie
5 mussels	18 potato-cheese casserole
8 consommé	
12 vegetable soup	
15 mixed salad	
19 strawberries	